

Revisions made to EPAC HURDAT:

Storm #6/1957 - 2008 Revision

02230 09/17/1957 M= 2 6 SNBR= 67 NOT NAMED XING=1
 02240 09/18*1701013 75 0X1741017 75 0X1781020 75 0* 0 0 0 0*
 02240 09/18*1701013 75 0X1741017 75 0X1781020 75 0X1821023 75 0

Previous track just offshore. New position is to bring the hurricane inland per Ed's book (NHC resource) and Mariner's Weather Log (MWL).

Storm #10/1957 - 2008 Revision

02330 10/01/1957 M= 6 10 SNBR= 71 NOT NAMED XING=1
 02335 10/01* 0 0 0 0* 0 0 0 0*1741194 75 0*1751199 75 0*
 02340 10/02*1801204 75 0*1891209 75 0*1981212 75 0*2031206 75 0*
 02345 10/03*2081197 75 0*2161192 75 0*2241187 75 0*2301170 75 0*
 02350 10/04*2361152 75 0*2391145 75 0*2421137 75 0*2501128 75 0*
 02355 10/05*2581119 75 0*2641112 75 0*2701105 75 0X2941091 75 0*
 02355 10/05*2581119 75 0*2641112 75 0*2701105 75 0X2941091 25 0*
 **
 02360 10/06X3221075 75 0X3311065 75 0X3281059 75 0* 0 0 0 0*
 02360 10/06L3221075 20 0L3311065 20 0L3281059 20 0* 0 0 0 0*
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Hurricane erroneously tracked well inland over very high mountains and throughout southwestern USA. Track better reflects likely reality of remnant low.

Storm #11/1957 - 2008 Revision

02370 10/17/1957 M= 5 11 SNBR= 72 NOT NAMED XING=0
 02375 10/17* 0 0 0 0* 0 0 0 0*1291029 75 0*1471035 75 0*
 02380 10/18*1591042 75 0*1651052 75 0*1701060 75 0*1741062 75 0*
 02385 10/19*1791063 75 0*1851063 75 0*1911063 75 0*1981063 75 0*
 02390 10/20*2051063 75 0X2151062 75 0X2251061 75 0X2351061 75 0*
 02390 10/20*2051063 75 0 0 0 0 0 0 0 0 0 0 0 0*
 ***** ** ***** ** ***** **
 02395 10/21X2451060 75 0X2551057 75 0X2651050 75 0* 0 0 0 0*
 02395 10/21 Delete all points

Recommend deleting this hurricane landfall. MWL says the hurricane rapidly dissipated before landfall. Also category 3 hurricane made landfall one day later in the same area. Original MWL never shows system inland.

Storm #11/1958 - 2008 Revision

02800 09/30/1958 M= 7 11 SNBR= 85 NOT NAMED XING=1
 02805 09/30*1561003 75 0*1581008 75 0*1601013 75 0*1611018 75 0*
 02810 10/01*1631023 75 0*1651028 75 0*1671033 75 0*1691039 75 0*
 02815 10/02*1701045 75 0*1721049 75 0*1741054 75 0*1791062 75 0*
 02820 10/03*1861070 75 0*1931076 75 0*2001082 75 0*2081089 75 0*
 02825 10/04*2191095 75 0*2341099 75 0*2501103 75 0*2641107 75 0*
 02830 10/05*2791110 75 0X2941112 75 0X3101112 75 0X3231110 75 0*
 02830 10/05*2791110 75 0X2941112 45 0X3101112 25 0L3231110 20 0*
 ** ** * **

02835	10/06X3341104	75	0X3391089	75	0X3381062	75	0*	0	0	0	0*
02835	10/06L3341104	20	0L3391089	20	0L3381062	20	0*	0	0	0	0*
	*	**	*	**	*	**					

Change to remove hurricane intensity over southwestern USA and add a more reasonable weakening rate over high terrain.

Storm #10/1959 - 2008 Revision

03165	09/04/1959	M= 8 10	SNBR= 97	NOT NAMED	XING=1									
03170	09/04*132	940	75	0*135	955	75	0*138	969	75	0*142	984	75	0*	
03175	09/05*147	997	75	0*154	1007	75	0*161	1016	75	0*171	1026	75	0*	
03180	09/06*179	1035	75	0*180	1039	75	0*180	1041	75	0*180	1048	75	0*	
03185	09/07*180	1054	75	0*181	1060	75	0*183	1066	75	0*185	1072	75	0*	
03190	09/08*188	1077	75	0*192	1080	75	0*196	1082	75	0*201	1083	75	0*	
03195	09/09*209	1085	75	0*219	1090	75	0*229	1096	75	0*240	1102	75	0*	
03200	09/10*250	1109	75	0*256	1116	75	0*260	1124	75	0*268	1133	75	0*	
03205	09/11*279	1143	75	0X296	1151	75	0X318	1159	75	0*	0	0	0	0*
03205	09/11*279	1143	75	0X296	1151	45	0X318	1159	25	0*	0	0	0	0*
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Hurricane over hilly terrain of Baja California for 36 hours and couldn't have maintained hurricane intensity. System dissipates before reaching southern California and best track change smooths the dissipation stage.

Storm #15/1959 - 2008 Revision

03335	10/23/1959	M= 7 15	SNBR= 102	NOT NAMED	XING=1									
03340	10/23*126	967	75	0*127	976	75	0*130	985	75	0*135	993	75	0*	
03345	10/24*140	1000	75	0*145	1008	75	0*150	1016	75	0*156	1023	75	0*	
03350	10/25*161	1029	100	0*165	1034	100	0*168	1039	110	0*170	1045	110	0*	
03355	10/26*172	1052	120	0*175	1056	120	0*178	1058	120	0*183	1057	120	0*	
03360	10/27X188	1053	120	0X193	1048	120	0X197	1044	140	958X201	1040	45	0*	
03360	10/27X188	1053	120	0X193	1048	140	958X197	1044	140	958X201	1040	45	0*	
				***			***							
03365	10/28X205	1037	45	0X210	1033	25	0X216	1029	25	0X222	1026	25	0*	
03370	10/29X228	1023	25	0X234	1021	25	0X240	1020	25	0*	0	0	0	0*

Change to make the Great Hurricane of 1959 become a Cat 5 over water instead of over land. Kept intensity inland the same because of 135+ kt wind report in Manzanillo. May have been stronger than 140 kt offshore.

EP151959 - 2016 Reanalysis of Great Mexico Hurricane 1959

authors Andrew Hagen (StormGeo), Josh Morgerman (iCyclone), Erik Sereno Trbaldo, Jorge Abelardo González

Intro

Mexico Landfall: 10/27/1959 12Z - 19.1N 104.4W - 120 kt - 955 mb - OCI 1007 mb - ROCI 175 n mi - RMW 7-8 n mi - forward speed 5 kt

Minor track changes and major intensity changes are analyzed for this historic tropical cyclone that struck near Manzanillo, Mexico, as a devastating hurricane—the deadliest and most destructive landfall in the Eastern Pacific basin, and one of the strongest.

Evidence for these alterations comes from the Historical Weather Maps Series; the COADS ships database; Mariners Weather Log; the NCDC EDADS2 Website; the monthly Climatological Data National Summary; Zeluff; Lozoya; the Mexican government's report on the hurricane (in Boletín Hidrológico No. 16); Proceedings of the Merchant Marine Council; images of handwritten data logs from the Manzanillo Observatory; a letter from Observatory ex-supervisor Alejandro Ramos Mendez de Leon; letters from Observatory ex-supervisor Raul Martinez Venegas; personal communications with Mr. Martinez; and a letter with a personal firsthand account from Luis Garcia Castillo.

(Note: In the source documents, most local times are believed to be Z minus 7 hours—however, the NCDC EDADS2 data and some personal accounts are believed to be Z minus 6 hours. Manzanillo is in the Central Time Zone and is Z minus 6 hours.)

Chronology & Observations

October 22

HWM analyzes a closed low of at most 1005 mb near 12.3N 94W. HURDAT did not previously list a system on this day. Ship highlights: 35 kt E and 1008 mb at 12Z at 14.7N 96.6W (COA); 35 kt NE and 1010 mb at 18Z at 14.5N 95.5W (COA). "This storm appears to have originated as a tropical depression about 250 miles south of the Gulf of Tehuantepec on October 22" (Oct. 1959 MWR p. 394). "[This system] first appeared on the weather charts October 22, at 1800, near 13N, 95.5W as a result of a report of east-northeast winds of 35 kt from the RUTH LYKES. The point of origin of this storm is uncertain but it probably occurred several degrees east of 95W" (Climatological Data National Summary).

October 23

HWM analyzes a tropical storm of at most 1000 mb near 13.9N 98.3W. HURDAT lists this as a 75-kt hurricane at 13.0N 98.5W. Ship highlights: 40 kt SSE and 1011 mb at 03Z at 13.1N 93.4W (COA); 25 kt WNW at 1002 mb at 09Z at 12.1N 98.3W (COA); 35 kt ESE and 1006 mb at 18Z at 16.0N 99.2W (COA); 40 kt E and 1007 mb at 18Z at 15.4N 98.9W (COA). One other gale of 35 kt and 5 other low pressures of 1003–1005 mb. "During October 23 and 24 the forward speed of the storm was about 9 kt. Highest wind speeds reported were 40 kt, including two reports from vessels directly in the path of the storm. Maximum wind speeds accompanying the storm at this time were estimated to be 55 kt" (Climatological Data National Summary).

October 24

HWM analyzes a tropical storm of at most 1000 mb near 15.1N 101.6W. HURDAT lists this as a 75-kt hurricane at 15.0N 101.6W. Ship highlights: 40 kt SE and 1008 mb at 00Z at 16.6N 99.8W (COA); 35 kt ESE and 1006 mb at 00Z at 15.1N 98.3W (COA).

October 25

HWM analyzes a tropical storm of at most 1000 mb near 16.7N 103.6W. HURDAT lists this as a 110-kt hurricane at 16.8N 103.9W. Ship highlights: 40 kt E and 1007 mb at 00Z at 16.9N 101.4W (COA); 40 kt E and 1009 mb at 21Z at 18.1N 103.3W (COA).

October 26

HWM analyzes a tropical storm near 17.9N 105.7W. HURDAT lists this as a 120-kt hurricane at 17.8N 105.8W. Ship highlights: 45 kt ESE and 1008 mb at 00Z at 18.3N 103.8W (COA); 1002 mb at 22Z at 19.1N 104.3W (MWL, Zeluff). "The storm reached a position near 17.7N, 106W, or about 130 mi southwest of Manzanillo at 12Z October 26" (Climatological Data National Summary).

October 27

HWM analyzes a hurricane of at most 995 mb near 19.5N 104.5W. HURDAT lists this as extratropical with 140-kt winds at 19.7N 104.4W. Ship highlights: 70 kt SSE at 00Z at 18.5N 105.0W (Climatological Data National Summary); 100 kt at 06Z at 18.9N 104.9W (Climatological Data National Summary); 75 kt plus E and 984 mb at 10Z at 19.1N 104.3W (MWL, Zeluff); 104 kt E and 965 or 969 mb at 11Z (MWL, Zeluff); 958 mb (min p) at 1115Z at 19.051N 104.335W (MWL, Zeluff); 122 kt plus SSE with 963 mb at 12Z (MWL). Land/station highlights: 969.5 mb (min p inside RMW) at Manzanillo at 1230Z (EDADS2, Lozoya); 126 kt WSW (max wind) with 973 mb at Manzanillo at 13Z (EDADS2); 75 kt SE at Colima (EDADS2). "At 0000 of the 27th at 18.5N, 105W, the HIVEMARU reported south-southeast winds of 70 kt, rapidly falling barometer, and a sea of 30 ft, the first positive evidence that the storm had reached hurricane intensity. Further intensification evidently occurred as the storm moved east-northeastward at about 6 kt toward Manzanillo. At 0600 of the 27th, the MEXICO MARU reported 100 kt winds at 18.9N, 104.9W. Reports received after the storm from the MARY BARBARA, at a position just outside Manzanillo Harbor on the 27th, indicated a minimum barometer reading of 958 mb at 1115 [and] passage of the eye of the storm by 1150..." (Climatological Data National Summary). The MWL article on the MARY BARBARA account, which is taken directly from Zeluff, states that the ship had SSE 122 kt plus with 963 mb at 12Z, increasing to SSE 130 kt at 1210Z, veering to W at 135 kt plus at 13Z (lasting to 14Z) with a rapidly rising barometer. All of these wind values were estimated, not measured. (The estimated position of the ship when the eye was encountered from 1115Z-1150Z was 19.051N 104.335W, although this estimate is based solely on the captain's verbal descriptions of nearby landmarks and can't be confirmed.) Regarding the MARY BARBARA's encounter with the hurricane... "During the early morning hours of the 27th the wind increased to hurricane intensity and the barometer continued its rapid fall... At 0450 [1150Z], the eye of the storm was encountered [just outside Manzanillo Harbor]. During the lull the crew could see that they were being driven toward a headland about a third of a mile off the starboard bow; fortunately the reversal of winds with the passage of the eye drove them in the opposite direction. The wind increased rapidly and within the hour, they encountered the highest winds and seas... At 0900 [1600Z] the winds and seas began to subside" (MWL). "The CACALILAO, in Manzanillo Harbor, indicated a minimum barometer reading of 964 mb before 1210 with east-southeast winds estimated at 135 kt at 1210, shifting to southwest 60 kt by 1330 and to west 100 kt by 1435. Salvaged wind instruments in Manzanillo, according to newspaper accounts, showed winds reached a speed of 146 mph or 127 kt. Windspeeds experienced in Manzanillo may have been higher" (Climatological Data National Summary).

October 28

HWM analyzes a spot low with no closed isobars near 21N 102.6W. HURDAT lists this as extratropical with 25-kt winds at 21.6N 102.9W. No gales or low pressures.

HURDAT began this cyclone originally on 23 October at 00Z as a 75-kt hurricane at 12.6N 96.7W. Available observations indicate that the precursor to this system was likely located in the general vicinity of 12N 93W at 18Z on 21 October. However, there is not enough observational evidence to close off a circulation as early as the 21st. Observational evidence increases on 22 October, when W and SW winds are observed less than 100 n mi SE and S of the analyzed center. In addition to the evidence of a closed circulation, there were two 35-kt gales observed on the 22nd. Furthermore, commentary from multiple sources and references indicate that the 22nd was the first day of the cyclone's existence. The cyclone is begun at 12Z on 22 October as a 40-kt tropical storm. Intensities of 50 and 55 kt are analyzed for 00Z and 06Z on the 23rd (down from 75 kt originally at both times—major changes). The cyclone is analyzed to have attained hurricane intensity at 18Z on the 23rd—18 hours later than originally. On the 22nd and 23rd, there were a couple of ship observations at distances of 60-100 n mi from the center. These were somewhat helpful in the track and intensity analysis. However, there were few (if any) ship observations within 50 n mi of the center those days. The largest track change made on the 23rd is only 0.3 degrees. Data were much more sparse from the 24th through 26th, and it doesn't appear as though there were any observations within 100 n mi of the center. The largest track change made during this period was also just 0.3 degrees. Only minor intensity changes were implemented—at times—from the 24th through the 26th, and these were mainly implemented to smooth out the intensity in the best track. There is no evidence to support the 25-kt intensity increase in 6 hours from the 18Z on the 24th to 00Z on the 25th, so this jump is smoothed out significantly. From genesis through the 26th, the strongest wind recorded was 45 kt and the lowest pressure recorded was 1002 mb. Nevertheless, the intensities on the 25th and 26th are only decreased by 5-10 kt from the original HURDAT values. Once the cyclone was within 12 hours of the Manzanillo area, a ship recorded 70 kt SSE at 00Z on the 27th at 18.5N 105.0W. Utilizing this observation along with other data, a position of 18.4N 105.1W is analyzed at 00Z on the 27th (18.8N 105.3W originally). At 06Z on the 27th, another ship recorded 100 kt (no direction) and 995 mb around the same time. The ship was at 18.9N 104.9W at the time, and the reanalyzed position at the time is 18.8N 104.7W (originally 19.3N 104.8W). The ships that reported the 00Z and 06Z observations were located over the Pacific Ocean and were not in or near Manzanillo Harbor.

Landfall Analysis

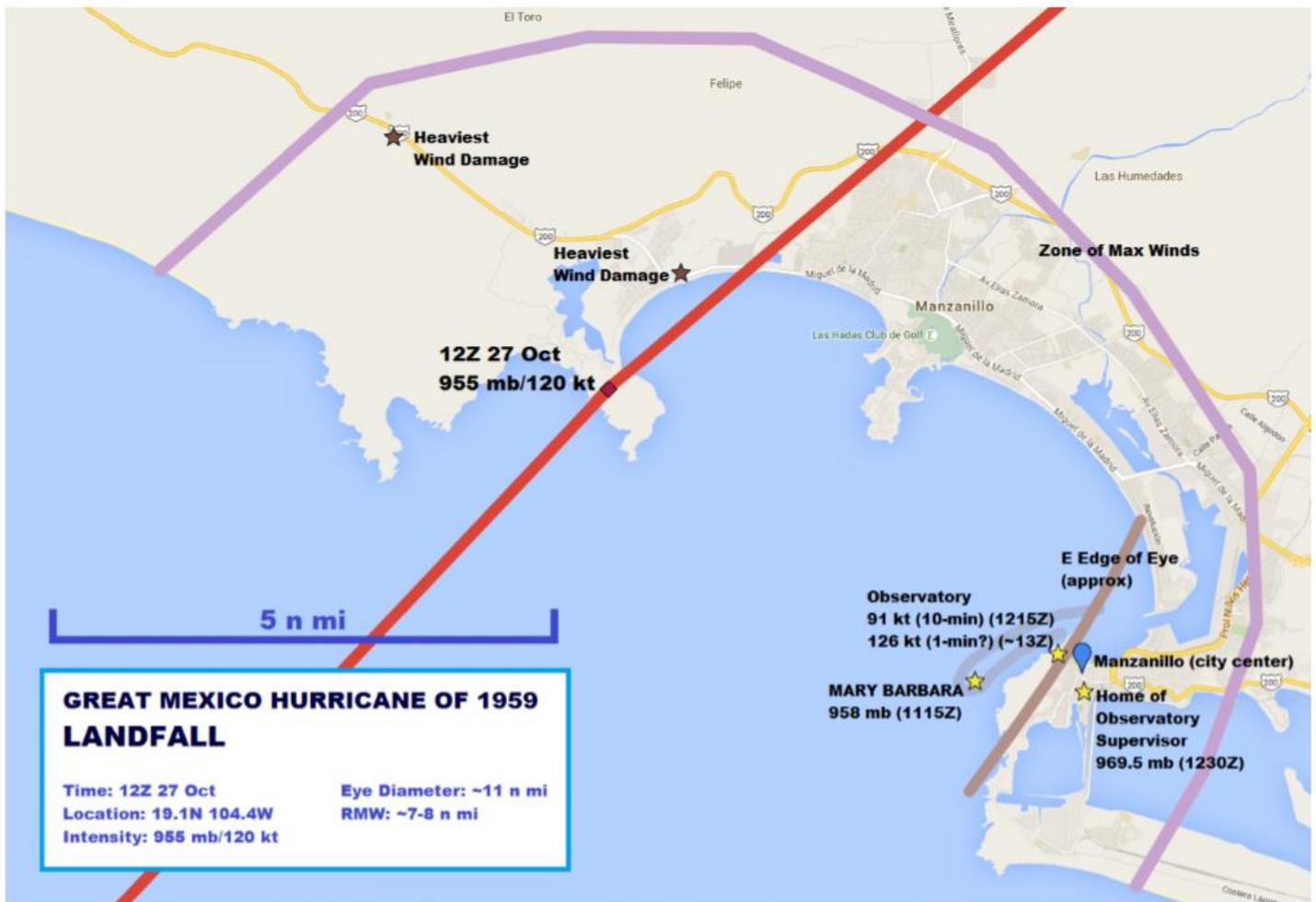


Figure 1: Zoomed-in view of landfall region.

Location & Eye Size

Landfall is analyzed to have occurred at 19.1N 104.4W—which is in Santiago Bay, approximately 5 n mi NW of Manzanillo, Mexico—at 12Z on the 27th.

There is a high degree of confidence in this landfall location/time, as it's well-supported by observations from the two aforementioned ships as well as observations from Manzanillo. Additionally, this landfall location is supported by the Mexican government's report (translated from Spanish): "According to the rotation of cyclones, and the general direction of the winds, it is assumed that the vortex was close to or came ashore in Santiago Bay" (Boletín Hidrológico No. 16). The original HURDAT track indicates landfall 6 hours too soon and too far NW—thus the adjustment of the track by half a degree on the 27th.

The Manzanillo Observatory supervisor, Mr. Alejandro Ramos Mendez de Leon, said in a certified letter that the "vortex" moved SW to NE, passing near and to the W of the Harbor, and that they failed to see a "central calm". Mr. Raul Martinez Venegas, a later Observatory supervisor, suggested in a letter that the eye passed very close to the port, and there was a very brief calm. A firsthand account from an unspecified location in Manzanillo—shared in a personal letter by Mr. Luis Garcia Castillo—described some calm, with stars appearing in the sky, before powerful winds resumed, now from the S. Wind observations at 15-minute intervals from Manzanillo indicate that the sustained winds likely only dropped to strong tropical storm force within the lull. It's possible the winds could

have dropped further in between one of the 15-minutely observations. The ships MARY BARBARA and CACALILAO— believed to be near the SE corner of Manzanillo Harbor, close to the port—reported periods of partial calm. Based on the data as well as the personal accounts taken together, Manzanillo most certainly experienced the inside of the right RMW. The edge of the calm eye likely passed very near or just NW of Manzanillo.

The analyzed landfall point (19.1N 104.4W) and reports of very brief calm near or in Manzanillo (5-6 n mi away) suggest the eye was ~11 n mi wide. This estimated eye diameter falls within the estimated 2035 km (11-19 n mi) described in Mr. Raymundo Padilla Lozoya's book, "El huracan del 59."

Pressure

There were three observational platforms—two ships in Manzanillo Bay and the Manzanillo Observatory— that aided in the intensity analysis of the landfall.

The lowest pressure recorded for the lifetime of the storm was 958 mb from the ship MARY BARBARA. This observation was recorded inside the right RMW, and it may have been recorded inside the right half of the eye. Based on commentary, we are judging that the winds likely decreased to the lower limits of tropical storm force within the RMW, but it is possible winds may have been less than tropical storm force in the eye for several minutes. The lull lasted for 35 minutes, from 1115Z-1150Z. Based on all available observations and commentary, the best estimate is that the ship was located within the E edge of the eye, but a few n mi to the E of the exact center. Since this occurred less than 1 hour prior to landfall, we can estimate a landfall central pressure from this data. A central pressure of 955 mb is analyzed for the 12Z/27th landfall, due to the likelihood that the central pressure was a few mb lower than the minimum pressure value of 958 mb recorded by the MARY BARBARA. Although the central pressure could have been a few mb lower than that value, it is highly unlikely that the central pressure was less than 950 mb, since the 958 mb was measured within a lull that lasted for at least 35 minutes.

Another ship, the CACALILAO, located inside Manzanillo Harbor and slightly farther away from the path of the center, recorded a minimum pressure of 964 mb. The CACALILAO's winds decreased to 60 kt inside the RMW (it is unclear if the winds got lower than that). The timing of the ship's lowest pressure (1210Z) doesn't appear to correspond well to the time of the apparent lull. Although there are no data in between the 1210Z and 1330Z observations, the 60 kt 1330Z observation indicates the ship was likely experiencing a lull at that time, since winds were higher again later.

The Manzanillo Observatory recorded a minimum pressure of 969.5 mb at 1230Z. The pressure was 972.9 mb at 13Z, and this was also about the time when the max wind of 126 kt WSW is reported to have occurred. (More information on this wind observation can be found in the Winds section, below.) It should be noted that the Observatory pressure was recorded at a different location in the City than the winds—at the home of the Observatory supervisor, Mr. Alejandro Ramos Mendez de Leon: 19.04917N 104.3156W, ~ 6-7 m ASL.

Observations from the CACALILAO, MARY BARBARA, and the Observatory all support the analyzed landfall pressure of 955 mb.

Winds

A central pressure of 955 mb equals 108 kt according to the Brown et al. (2006) S-of-25N and intensifying relationship. The forward speed of the hurricane was a slow 5-6 kt. The radius of maximum winds (RMW) of this hurricane at landfall is estimated to have been in the range of 5-10 n mi—and likely around 7-8 n mi. This estimate is based on wind observations (and lulls) from multiple points, the storm's forward speed, and the Mexican government's report (in Boletín Hidrológico No. 16) which describes a small, compact cyclone, with the maximum winds occurring in Manzanillo and Santiago Bays (a small area, only ~6 n mi wide), and the zone of "considerable damage" being "relatively small", stretching only 120 km (65 n mi) along the Colima coast, from Barra de Navidad, Jalisco, to Coahuayana, Michoacan. Based on the size and speed taken together, 5 kt is added to the pressurewind relationship to arrive at a value of 113 kt—for a first guess at the intensity based on the pressurewind relationship alone.

The CACALILAO and the MARY BARBARA both estimated winds at or above 135 kt—however, ship estimates of major hurricane winds have limited accuracy. There are two different records of the winds at the Manzanillo Observatory. The EDADS2 Website, which contains the official monthly observational data from the Manzanillo Observatory, indicates that Manzanillo recorded a maximum wind of 65 m/s (126 kt) from the WSW at 13Z, but it's unclear if the reading occurred at exactly that time—it may have been earlier or later. Multiple primary sources cite this value as an official maximum wind observation. The other record from Manzanillo Observatory is a data log with observations every 15 minutes. Apparently, the Observatory was unmanned during the storm and the data log was reconstructed afterward from the recovered anemogram. The 15-minute log shows a max wind of 47 m/s (91 kt) at 1115Z, with a peak value of 65 m/s (126 kt). According to the Climatological Data National Summary, "Windspeeds experienced in Manzanillo may have been higher [than 127 kt]"—and this may be referring to the fact that Observatory personnel estimated winds went as high as 70 m/s (136 kt). The Observatory wind data end at 13Z, suggesting the instrument may have failed—consistent with reports that the Observatory was destroyed during the storm. (Note: Both Observatory records are notated in local time—however, due to the timing of pressure readings, peak winds, and directional shifts, we believe the monthly data chart (from EDADS2) is Z minus 6 hours and the 15-minute data log is Z minus 7 hours.)

The 65 m/s (126 kt) is close to—and believed to be the basis for—the 127 kt reported in many other sources. This value, along with the estimated 70 m/s (136 kt), may have formed the basis for traditional estimates of this hurricane's intensity. Further investigation reveals that the 47 m/s (91 kt) measured at Manzanillo Observatory at 1215Z was the maximum sustained (10-min) wind recorded at that location. The oft-cited 65 m/s (126 kt) was apparently a 1-min sustained wind, as per the Observatory's ex-supervisor, Mr. Raul Martinez Venegas, in a telephone call (15 January 2016). However, there seems to be some uncertainty around this, as the 65 m/s was described as a peak gust of several seconds' duration in an earlier call (30 January 2015). As stated above, the 70 m/s (136 kt) was apparently an estimate, as the anemogram's upper limit was 65 m/s. Even accepting the 65 m/s (126 kt) as a 1-min sustained wind, it's important to note 1) the height of the anemometer (10 m AGL, but on a hill near the Bay at 45-50 m ASL (exact location: 19.05544N 104.3201W)) and 2) the uncertainty regarding the exposure of the instrument. Converting the 10-min 91 kt to a 1-min wind yields a lower value of ~102 kt.

In light of these factors, the Observatory wind data in themselves do not support the Category-5 landfall intensity listed in the original HURDAT. However, it's possible the instrument may have failed before the highest winds, as there are no data after 13Z, and the MARY BARBARA (located just 1-2 n mi to the WSW of

Manzanillo) estimated the highest winds occurred at 13Z and 14Z. (However, peak winds at 14Z seem unlikely given the observed pressure.) Also, it's possible the highest winds missed the Observatory: the Mexican government's report (in Boletin Hidrologico No. 16) mentions the heaviest wind damage occurred W of Santiago Bay, in La Cuarenta and La Central.

Taking into account these Observatory measurements, the very high estimates (135+ kt) from two ships, the heavy wind damage in Manzanillo, and the pressure-wind calculations described above, a blended landfall intensity of 120 kt is analyzed at 12Z on the 27th (down from 140 kt originally at landfall and at 12Z).

Post-Landfall Impact

The city of Colima, located 21 n mi to the right of the track and 25 n mi inland, recorded a 75-kt max wind on the 27th, likely around 16Z. Runs of the Kaplan and DeMaria Inland Decay Model yield 74, 52 and 37 kt for 27/18Z, 28/00Z and 28/06Z, respectively. Highest winds within 2 hours of synoptic times are 75 kt at 16Z on the 27th and 30 kt at 00Z on the 28th. The hurricane is likely to have weakened slightly faster than the Kaplan and DeMaria rate since it was a small cyclone, and it was moving into the rugged terrain of Mexico. Revised winds in HURDAT are 70 kt at 18Z on the 27th (up from 45 kt originally—a major change), 45 kt at 00Z on the 28th (no change), and 25 kt at 06Z on the 28th (no change).

HURDAT originally listed this cyclone as extratropical beginning at 00Z on the 27th. There is no way a 120-kt hurricane with a ~7 n mi RMW making landfall in the deep tropics in October would be extratropical by this point. Temperatures in the area were warm on the 27th, although there was a front dipping S into N Mexico by the 27th. The cold and dry air continued S as the weakening cyclone moved NNE—but the cyclone is not analyzed to have become extratropical before dissipating. The cyclone is analyzed to have dissipated over Mexico prior to 12Z on the 28th, more than 24 hours earlier than originally believed—a major change.

Original & Recommended Revised HURDAT

Format where there are changes to the existing HURDAT:

Original Line Revised Line

The 22nd is new to HURDAT

10/22 12Z: 12.2N 95.1W 40 kt

10/22 18Z: 12.4N 95.7W 45 kt

10/23 00Z: 12.6N 96.7W 75 kt (original)

10/23 00Z: 12.6N 96.5W 50 kt (revised)

10/23 06Z: 12.7N 97.6W 75 kt

10/23 06Z: 12.8N 97.3W 55 kt

10/23 12Z: 13.0N 98.5W 75 kt

10/23 12Z: 13.1N 98.2W 60 kt

10/23 18Z: 13.5N 99.3W 75 kt

10/23 18Z: 13.5N 99.2W 70 kt

10/24 00Z: 14.0N 100.0W 75 kt (no changes)

10/24 06Z: 14.5N 100.8W 75 kt (no changes)

10/24 12Z: 15.0N 101.6W 75 kt (no changes)

10/24 18Z: 15.6N 102.3W 75 kt

10/24 18Z: 15.5N 102.2W 80 kt

10/25 00Z: 16.1N 102.9W 100 kt

10/25 00Z: 16.0N 102.7W 90 kt

10/25 06Z: 16.5N 103.4W 100 kt

10/25 06Z: 16.4N 103.3W 95 kt

10/25 12Z: 16.8N 103.9W 110 kt

10/25 12Z: 16.7N 103.9W 100 kt

10/25 18Z: 17.0N 104.5W 110 kt

10/25 18Z: 17.0N 104.5W 105 kt

10/26 00Z: 17.2N 105.2W 120 kt

10/26 00Z: 17.2N 105.1W 110 kt

10/26 06Z: 17.5N 105.6W 120 kt

10/26 06Z: 17.5N 105.4W 115 kt

10/26 12Z: 17.8N 105.8W 120 kt

10/26 12Z: 17.8N 105.5W 115 kt

10/26 18Z: 18.3N 105.7W 120 kt

10/26 18Z: 18.1N 105.4W 115 kt

10/27 00Z: 18.8N 105.3W 120 kt ET

10/27 00Z: 18.4N 105.1W 120 kt

10/27 06Z: 19.3N 104.8W 140 kt ET 958 mb

10/27 06Z: 18.8N 104.7W 120 kt

10/27 12Z: 19.7N 104.4W 140 kt ET 958 mb

10/27 12Z: 19.1N 104.4W 120 kt 955 mb (Landfall)

10/27 18Z: 20.1N 104.0W 45 kt ET

10/27 18Z: 19.5N 103.9W 70 kt

10/28 00Z: 20.5N 103.7W 45 kt ET

10/28 00Z: 20.1N 103.5W 45 kt

10/28 06Z: 21.0N 103.3W 25 kt ET

10/28 06Z: 20.8N 103.3W 25 kt

The 28th at 12Z through the 29th at 12Z is removed from HURDAT.



Figure 2: HURDAT (blue) vs. REANALYZED (red) track.



Figure 3: HURDAT (blue) vs. REANALYZED (red) track (zoomed in on landfall).



Figure 4: REANALYZED track (alone).

Interactive Map

A Google Map of this reanalysis is available at: <http://goo.gl/tM5rfc>

The map has four layers:

Original HURDAT Track. This is the current, official best track. Blue vectors connect the 6-hour positions. Each point can be clicked for coordinates and intensity. REANALYZED Track. This is our recommended, revised best track. Red vectors connect the 6-hour positions. Each point can be clicked for coordinates and intensity. Boletín Hidrológico No.16. This maps the cyclone's wind impacts, as described by the Mexican government's report. Key Locations. This maps important geographical locations and observation points mentioned in the analysis, as well as the estimated E edge of the eye at landfall.

When the map is first opened, all four layers are visible—however, layers can be turned off or on in any combination, depending on what the user would like to see. The user can also zoom in on specific locations, click map features to get more info, and use map tools to measure distances.

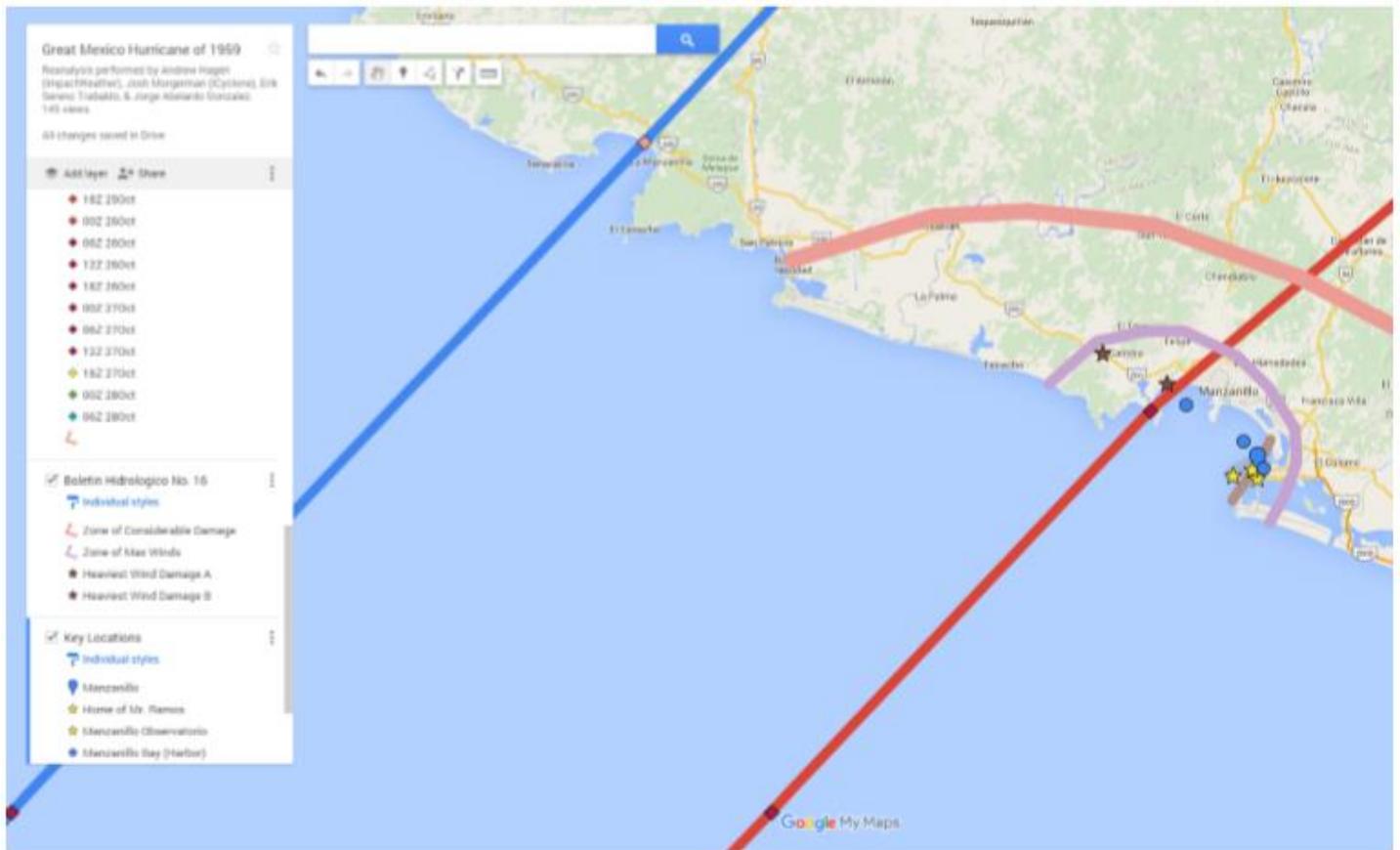


Figure 5: Interactive Google Map with layers tool.

Sources

The following sources contributed to this reanalysis. Several of them are compiled in this Dropbox folder: <https://goo.gl/SjEc5p>

Books & Documents

Lozoya, Raymundo Padilla. El huracan del 59. Colima, Mexico: Universidad de Colima, 2006. Print.

Secretaría de Recursos Hidráulicos (1961) Boletín Hidrológico No. 16., datos de la región PacíficoCentro. Dirección de Hidrología, México, D.F.

Zeluff, George N. (1960). Hurricane Off Manzanillo, Proceedings of the Merchant Marine Council, 17(5), 76-79.

Fuller, John W. (1960). Mary Barbara Encounters Manzanillo Hurricane, Mariners Weather Log, 4(2), 27-29.

Crooks, Raymond C. (1960). Tropical Cyclones in the Eastern North Pacific, 1959, Climatological Data National Summary-Annual 1959, 10(13), 63-66.

Historical Letters

Garcia Castillo, Luis (1959). Personal letter, written to Claudia C. de Garcia in Manzanillo on 14 December 1959.

Ramos Mendez de Leon, Alejandro (1960). Official, government-certified letter Re: observations in Manzanillo during the hurricane (by the Manzanillo Observatory's supervisor at the time), written on 18 April 1960.

Martinez Venegas, Raul (2010). Letter about the hurricane's effects in Manzanillo (by one of the Manzanillo Observatory's ex-supervisors), written on 27 October 2010.

Data Records

Monthly data record from the Manzanillo Observatory (Servicio Meteorologico Mexicano) for October 1959.

Handwritten, 15-minutely wind data log from the Manzanillo Observatory (Servicio Meteorologico Mexicano) for 27 October 1959.

Personal Communications

Personal letter from Raul Martinez Venegas, ex-supervisor of the Manzanillo Observatory.

Phone calls with Raul Martinez Venegas, ex-supervisor of the Manzanillo Observatory, on 30 January 2015 and 15 January 2016.

Internet

<http://goo.gl/lstM3x> (firsthand account of storm) <http://goo.gl/Slx3S2> (images of hurricane's aftermath in Manzanillo) <http://goo.gl/4WMFLp> (images of hurricane's aftermath in Manzanillo)

Storm #7/1960 HYACINTH - 2008 Revision

03610	10/21/1960	M= 3	7	SNBR= 109	HYACINTH	XING=1
03610	10/21/1960	M= 3	7	SNBR= 109	HYACINTH	XING=0

*

03615	10/21*	0	0	0	0*	0	0	0	0*1831052	75	0*1891060	75	0*
03620	10/22*1971066	75	0*2091071	75	0*2191073	75	0X2241073	75	0*	0	0	0	0*
03625	10/23X2281072	75	0X2311071	75	0X2341070	75	0*	0	0	0	0	0*	
03625	10/23X2281072	75	0X2311071	45	0X2341070	25	0*	0	0	0	0	0*	

**

**

Recommend deleting as a landfall. MWL states that Hyacinth rapidly dissipated as it approached the coast. Original track never brought it inland, even after extrapolation in the 1970s. Suggested changes show a smooth dissipation and keep with general intensity assignments of the era.

Storm #1/1961 IVA - 2008 Revision

03635	06/09/1961	M= 4	1	SNBR= 110	IVA	XING=1							
03640	06/09*	0	0	0	0*	0	0	0	0*1351000	75	0*1401008	75	0*
03645	06/10*1461014	75	0*1531017	75	0*1601019	75	0*1681020	75	0*	0	0	0*	
03650	06/11*1761020	75	0X1871019	75	0X1981017	75	0X2051009	75	0*	0	0	0*	

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03650 06/11*1761020 75 0X1871019 45 0X1981017 35 0X2051009 25 0*
                                **                                **
03655 06/12X208 993 75 0* 0 0 0 0* 0 0 0 0* 0 0 0 0 0*
03655 06/12L208 993 20 0* 0 0 0 0* 0 0 0 0* 0 0 0 0 0*
      *                **

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This is to fix erroneous maintenance of hurricane conditions over very high terrain of central Mexico.

EP091961 - 2019 Revision - System Removed from HURDAT2.

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03845 11/01/1961 M= 3 9 SNBR= 118 SIMONE XING=1 SSS=0
03850 11/01* 0 0 0 0*140 920 25 0*139 934 25 0*143 944 45 0*
03855 11/02*150 950 45 0*158 958 25 0*166 957 25 0*172 959 25 0*
03860 11/03*176 954 25 0*180 952 25 0*186 946 25 0* 0 0 0 0*
03865 TS

```

Daily Metadata:

November 1:

1. Maps and old HURDAT:

- HWM analyzes a tropical storm of at most 995 mb at 14.0N, 91.5W and a spot low pressure at 13.5N, 93.5W at 12Z.
- HURDAT lists a 45 kt tropical storm for Hattie (from Atlantic HURDAT2) at 15.7N, 90.1W at 06Z (last position).
- HURDAT lists a 25 kt tropical depression for Simone (from NE Pacific HURDAT2) at 13.9N 93.4W at 12Z.
- Microfilm shows a single closed low pressure of at most 1002 mb at 14.0N, 93.5W at 12Z.

2. Ship highlights:

- 25 kt NNW and 1004 mb at 12.7N, 92.3W at 00Z (micro).
- 35 kt W and 1000 mb at 13.5N, 93.1W at 12Z (COADS).
- 40 kt W and 1002 mb at 14.0N, 94.4W at 18Z (COADS).

3. Discussion:

- Randerson: "After moving inland, Hattie began to curve to the southwest and dissipate rapidly into a tropical storm over Guatemala...This analysis shows that the surface pressures along the west coast of Guatemala were subnormal and that a well-organized cyclone was still present. As tropical storm Hattie moved into the Gulf of Tehuantepec, the San Francisco Weather Bureau named it tropical storm Simone and noted that this Pacific storm was the remnants of hurricane Hattie."
- Reanalysis: After landfall, the large hurricane Hattie continued inland on a southwest course and rapidly weakened. (For more details, see the Atlantic basin reanalysis metadata for Hattie.) The last position of Hattie is analyzed at 06Z on the 1st, same as originally shown in HURDAT. Over the Eastern Pacific, synoptic data indicates that the circulation of Hattie remained the dominant feature as the hurricane made landfall in Belize and moved southwestward toward that ocean basin. There is no evidence to support the statement in the Monthly Weather Review that Tropical Storm Simone was already in existence as Hattie made landfall in Belize. Furthermore, the first advisory issued on Simone clearly indicates the opinion at

the time was that this tropical cyclone was the former Atlantic hurricane:

WH ADVISORY KSFO 011500Z
SAN FRANCISCO WEATHER BUREAU TROPICAL STORM ADVISORY NUMBER ONE
SIMONE 1500Z NOVEMBER 1 1961.
CENTER OF TROPICAL STORM SIMONE ESTIMATED AT 14.0 NORTH 93.5 WEST
AT 1200Z NOVEMBER 1. POSITION FAIR BASED ON SHIP REPORTS TO WEST AND
SOUTH OF CENTER. PRESENT MOVEMENT ESTIMATED TOWARD THE WEST AT 8
KNOTS. HIGHEST WINDS ESTIMATED 45 KNOTS AND GALE FORCE WINDS OUTWARD
ABOUT 120 MILES FROM THE CENTER IN SOUTH SEMICIRCLE AND 50 MILES
IN NORTH SEMICIRCLE. SEAS ARE ROUGH NEAR CENTER. THIS STORM WAS
GENERATED FROM THE REMAINS OF ATLANTIC HURRICANE HATTIE. REPEAT
CENTER ESTIMATED 14.0 NORTH 93.5 WEST AT 1200Z NOVEMBER 1.
NEXT REGULAR ADVISORY WILL BE ISSUED AT 2100Z NOVEMBER 1 BY
WEATHER BUREAU SAN FRANCISCO

Instead, the remnants of Hurricane Hattie became a Central American Gyre (lacking an inner core well-defined center structure required for a tropical cyclone) on November 1st while located along the Pacific coast of southeastern Mexico and Guatemala. Gale force westerly winds were occurring on the 1st south of Gyre's trough axis.

November 2:

1. Maps and old HURDAT:
 - HWM analyzes a closed low pressure of at most 1000 mb at 16.5N, 97.8W at 12Z.
 - HURDAT lists Simone as a tropical depression at 16.6N 95.7W at 12Z.
 - Microfilm shows a closed low pressure of at most 1002 mb at 16.0N, 97.7W at 12Z.
2. Ship highlights:
 - 20 kt W and 1001 mb at 15.8N, 98.9W at 00Z (micro).
 - 30 kt SW and 1005 mb at 14.8N, 96.0W at 12Z (micro).
3. Discussion
 - Randerson: "On 2 November, this tropical storm [Simone] began to curve to the north toward Saline Cruz, Mexico. As tropical storm Simone crossed the Isthmus of Tehuantepec, the rugged mountainous terrain of this region dissipated Simpon to a weak tropical depression".
 - Reanalysis: The Central American Gyre interacted with a powerful mid-latitude shortwave trough to substantially deepen and expand in area on the 2nd while located over southeastern Mexico and northern Central America. Gale force westerly winds continued to occur on the 2nd south of the Gyre's trough axis. By late on the 2nd and during the 3rd, an extratropical low pressure center had formed over the Bay of Campeche with a front extending from the low north-northeastward over the Gulf of Mexico to the southeastern United States while still low pressure with the Gyre also existed along the southern Mexico coast.

November 3:

1. Maps and old HURDAT:
 - HWM analyzes a closed low pressure of at most 1000 mb at 19.2N, 94.2W with a weakening cold front to the north at 12Z.
 - HURDAT does not list an organized system in the Atlantic Ocean on this date.
 - Microfilm shows a closed low pressure of at most 1002 mb at 21.5N, 95.3W with a frontal boundary to the north at 12Z.
2. Discussion/Reanalysis: By late on the 3rd, it appears that the Central American Gyre had dissipated, leaving only a broad, extratropical low pressure system in the Gulf of Mexico. Based on the ship and coastal observations, it appears that Simone never had a closed low-level circulation and therefore, was not been a tropical cyclone. Thus, in addition to alterations for Hattie, Simone is to be removed from the Northeast Pacific HURDAT.

Sources: the NHC microfilm maps, the Historical Weather Maps series, the COADS ship database, Monthly Weather Review, Navy reconnaissance book, Mariners Weather Log, Mexican synoptic maps, the NHC Storm Wallets, and Randerson (Weatherwise, 1963).

EP051962 - UNNAMED - 2013 Revision

Replacing value at: 1962-08-29 06Z was 18.0N 140.0W with 18.0N 141.0W

Typographical error

Storm #9/1962 DOREEN - 2008 Revision

04150	10/01/1962	M= 5	9	SNBR= 128	DOREEN	XING=1							
04155	10/01*	1391040	75	0*1401046	75	0*1431052	75	0*1471057	75	0*			0*
04160	10/02*	1511061	75	0*1561065	75	0*1611068	75	0*1681069	75	0*			0*
04165	10/03*	1751070	75	0*1841071	75	0*1921073	75	0*2021080	75	0*			0*
04170	10/04*	2111090	75	0*2281093	75	0*2461088	75	0*2651076	75	0*			0*
04170	10/04*	2111090	75	0*2281093	75	0*2461088	75	0*2651076	45	0*			0*
												**	
04175	10/05*	2801060	75	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0*
04175	10/05*	2801060	25	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0*
			**										

This change is to provide a more reasonable rate of dissipation over the high terrain of Mexico.

CP011963 - UNNAMED - 2013 Revision

Replacing value at: 1963-08-07 00Z was 22.7N 173.3W with 21.7N 173.3W

Typographical error

Storm #1/1964 NATALIE - 2008 Revision

04490	07/06/1964	M= 3	1	SNBR= 137	NATALIE	XING=1							
04495	07/06*	1681049	45	0*1821057	45	0*1961062	45	0*2091064	45	0*			0*
04500	07/07*	2221066	45	0X2341068	45	0X2461071	45	0X2621076	45	0*			0*
04500	07/07*	2221066	45	0X2341068	45	0X2461071	45	0X2621076	25	0*			0*
												**	
04505	07/08X	2821083	45	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0*
04505	07/08L	2821083	20	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0*
		*	**										

This change is also to provide a more reasonable rate of dissipation over the high terrain of Mexico.

Storm #10/1967 KATRINA - 2008 Revision

05985	08/30/1967	M= 5	10	SNBR= 174	KATRINA	XING=1							
05990	08/30*	1781072	45	0*1821080	45	0*1891088	45	0*1991097	45	0*			0*
05995	08/31*	2091107	75	0*2191114	75	0*2291118	75	0*2461113	75	0*			0*
06000	09/01*	2631110	75	0*2721116	75	0*2811124	75	0*2901132	75	0*			0*
06005	09/02*	3001141	75	0*3091146	75	0*3191146	75	0*3271134	45	0*			0*
06005	09/02*	3001141	75	0*3091146	75	0*3191146	45	0*3271134	25	0*			0*
							**					**	
06010	09/03X	3321108	45	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0
06010	09/03L	3321108	20	0* 0 0 0	0	0* 0 0 0	0	0* 0 0 0	0	0*			0
		*	**										

This is to take out the hurricane over Arizona that is currently in the best track. MWL says that its remnants made it into Arizona, not a full hurricane. It is highly unlikely that it kept hurricane strength over the southwestern US. Recommend weakening to TS over Arizona and show a typical dissipation thereafter.

Storm #15/1967 OLIVIA - 2008 Revision

06250 10/06/1967 M=10 15 SNBR= 179 OLIVIA XING=1
 06290 10/13*2231123 45 0*2321118 45 0*2401113 45 0*2531108 75 0*
 06295 10/14*2651110 75 0*2691116 75 0*2701122 75 0X2711127 45 0*
 06295 10/14*2651110 90 0*2691116 110 0*2701122 75 0X2711127 45 0*
 ** ***
 06300 10/15X2711132 25 0* 0 0 0 0* 0 0 0 0* 0 0 0 0*
 06305 HR

Change is based on a ship report of 939 mb. In addition, wind report of 110 kt matches approximate pressure/wind relationship that confirms the ship. Recommend Category 3 for hurricane landfall based on ship and land station (all MWL).

Storm #18/1968 SIMONE - 2008 Addition

This storm is missing from the best track file. Here is a suggested best track:
 0xxxx 10/18* 0 0 0 0* 0 0 0 0* 0 0 0 0*135 915 45 0*
 0xxxx 10/19*138 918 45 0*143 922 45 0*147 926 35 0* 0 0 0 0*

Also add landfall x=1 because system crossed the coast as a TS

For whatever reason, Simone 1968 is not in the best track, despite its existence chronicled in many publications.

The track of the system is based off the 1968 Navy Annual Tropical Cyclone Report, Annex A. No intensities are noted in the Navy report. However the 1968 MWR article says that winds of 40 to 45 kt were reported as the ship was (apparently) moving through the center. MWL mentions the same short-lived storm, though it has the ship reporting 40-50 kt maximum winds and a pressure of 1005.4 mb in the center. 45 kt is chosen as the maximum intensity, which better fits the relatively high pressure of 1005 mb reported than 50 kt. 45 kt is also a useful value because of the uncertainty involved since it is the value of generic tropical storms in the EPAC database.

Storm #16/1974 ORLENE - 2008 Revision

11100 09/21/1974 M= 4 16 SNBR= 288 ORLENE XING=1
 11105 09/21*158 975 30 0*161 980 30 0*162 988 40 0*1651007 40 0*
 11110 09/22*1691026 40 0*1741037 40 0*1801046 40 0*1871052 50 0*
 11115 09/23*1941058 50 0*1991063 50 0*2061067 55 0*2221071 60 0*
 11115 09/23*1941058 50 0*1991063 50 0*2061067 65 0*2221071 75 0*
 ** **
 11120 09/24*2401070 80 0X2551062 25 0X2701045 25 0* 0 0 0 0*
 11120 09/24*2401070 90 0X2551062 25 0X2701045 25 0* 0 0 0 0*
 **

Change is based on a reconnaissance report of 110 kt (measured) by an Air Force plane. The level is unknown so used a conservative 80% reduction to reach a landfall intensity of 90 kt. MWL states the hurricane rapidly intensified right before landfall.

EP071976 - GWEN - 2013 Revision

Replacing value at: 1976-08-14 06Z was 24.0N 136.0W with 24.0N 137.0W

Typographic error

EP081976 - HYACINTH - 2013 Revision

Replacing value at: 1976-08-08 18Z was 13.7N 108.9W with 13.7N 107.9W

Typographic error

EP101978 - JOHN - 2013 Revision

Replacing value at: 1978-08-25 00Z was 16.3N 145.2E with 16.3N 146.2W

Typographical error

EP131978 - MIRIAM - 2013 Revision

Replacing value at: 1978-08-29 18Z was 16.3N 149.2W with 15.3N 149.2W

Typographical error

Storm #11/1981 KNUT - 2008 Revision

15235	09/19/1981	M= 3 11	SNBR= 384	KNUT	XING=1					
15240	09/19*	1551045	30	0*1581060	35	0*1611074	45	0*1671088	50	0*
15245	09/20*	1761095	50	0*1861099	55	0*1971102	55	0*2081106	55	0*
15250	09/21*	2161094	50	0*2251081	45	0*2331070	40	0* 0 0	0	0*
15250	09/21*	2161094	50	0*2251081	45	0*2331070	40	0X2411059	30	0*
								*****	**	

This adjustment is to move the track inland based on MWL and extrapolation. For the 1981-1987 period, many storms simply stopped near or offshore because Redwood City stopped writing advisories on them before moving inland. Changes are cosmetic to show actual landfalls.

Storm #1/1983 ADOLPH - 2008 Revision

16540	05/21/1983	M= 8 1	SNBR= 412	ADOLPH	XING=1					
16545	05/21*	71 915	25	0* 74 927	25	0* 78 938	30	0* 81 947	40	0*
16550	05/22*	84 955	45	0* 87 967	45	0* 88 977	45	0* 91 987	50	0*
16555	05/23*	94 994	55	0* 981002	55	0*1001010	55	0*1041018	65	0*
16560	05/24*	1081026	80	0*1141032	95	0*1201039	95	0*1251045	95	0*
16565	05/25*	1301050	95	0*1341054	90	0*1391059	85	0*1441061	80	0*
16570	05/26*	1481060	65	0*1521058	60	0*1581055	60	0*1651054	55	0*
16575	05/27*	1741052	50	0*1821051	45	0*1921052	40	0*2021053	35	0*
16580	05/28*	2121056	35	0*2231058	35	0* 0 0	0	0* 0 0	0	0*
16580	05/28*	2121056	35	0*2231058	35	0X2341060	30	0* 0 0	0	0*
						*****	**			

Extrapolated inland based on MWL.

Storm #19/1983 TICO - 2008 Revision

17485 10/11/1983 M= 9 19 SNBR= 430 TICO XING=1

17490	10/11*	0	0	0	0*	0	0	0	0*	851004	25	0*	871009	30	0*
17495	10/12*	881014	30		0*	911020	30		0*	941026	30	0*	1021029	30	0*
17500	10/13*	1121029	35		0*	1211029	35		0*	1301029	40	0*	1381029	45	0*
17505	10/14*	1421029	55		0*	1471029	60		0*	1531031	75	0*	1571033	80	0*
17510	10/15*	1611036	75		0*	1621039	75		0*	1631042	80	0*	1651045	80	0*
17515	10/16*	1681049	80		0*	1711054	75		0*	1721060	80	0*	1731068	95	0*
17520	10/17*	1741074	100		0*	1751084	90		0*	1751090	100	0*	1761097	100	0*
17525	10/18*	1791101	100		0*	1831104	105		0*	1881104	110	0*	1931102	105	0*
17530	10/19*	2011095	115		0*	2111083	110		0*	2231070	110	0*	0	0	0
17530	10/19*	2011095	115		0*	2111083	110		0*	2231070	110	0X2351055	75	0*	
												*****	**		

Extrapolated inland based on MWL

Storm #7/1984 GENEVIEVE - 2008 Revision

17995 07/07/1984 M= 8 7 SNBR= 439 GENEVIEVE XING=0
 17995 07/07/1984 M= 8 7 SNBR= 439 GENEVIEVE XING=1
 *

18000	07/07*	0	0	0	0*	105	955	30	0*	109	961	30	0*	113	968	35	0*
18005	07/08*	117	978	40	0*	117	988	50	0*	120	997	60	0*	1231004	65	0*	
18010	07/09*	1301014	65		0*	1371022	75		0*	1451032	90	0*	1531043	90	0*		
18015	07/10*	1611051	90		0*	1701061	90		0*	1791070	90	0*	1881078	100	0*		
18020	07/11*	1941084	100		0*	2001089	90		0*	2041090	80	0*	2071090	65	0*		
18025	07/12*	2091090	65		0*	2111090	55		0*	2131091	50	0*	2141093	50	0*		
18030	07/13*	2171096	50		0*	2181100	45		0*	2201103	35	0*	2221106	35	0*		
18035	07/14*	2271108	30		0*	2351109	25		0*	0	0	0	0*	0	0	0	0*
18035	07/14*	2271108	30		0*	2351109	25		0X2431110	25	0*	0	0	0	0	0	0*
									*****	**							

Extrapolated inland based on MWL (did not remain offshore)

Storm #17/1984 NORBERT - 2008 Revision

18435 09/14/1984 M=13 17 SNBR= 449 NORBERT XING=1
 18475 09/21*1731161 115 0*1691154 105 0*1661144 105 0*1651133 105 0*
 18480 09/22*1651119 115 0*1651108 105 0*1661097 105 0*1701089 115 0*
 18485 09/23*1741084 115 0*1781083 110 0*1831083 105 0*1881087 105 0*
 18490 09/24*1931091 110 0*1991096 115 0*2071103 115 0*2151111 100 0*
 18495 09/25*2231120 90 0*2311126 105 0*2411131 105 0*2511135 75 0*
 18500 09/26*2611136 60 0* 0 0 0 0* 0 0 0 0* 0 0 0 0*
 18500 09/26*2611136 60 0*2711135 45 0* 0 0 0 0* 0 0 0 0*
 ***** **

Extrapolation and based on MWL report

Storm #18/1984 ODILE - 2008 Revision

18510 09/17/1984 M= 6 18 SNBR= 450 ODILE XING=1
 18515 09/17* 0 0 0 0* 0 0 0 0 0* 0 0 0 0 0*1431015 30 0*
 18520 09/18*1451022 35 0*1471029 35 0*1501036 35 0*1521041 40 0*
 18525 09/19*1541045 45 0*1571049 50 0*1601050 55 0*1631047 55 0*
 18530 09/20*1651045 65 0*1661041 65 0*1661036 65 0*1661032 65 0*
 18535 09/21*1661026 65 0*1641019 65 0*1631012 65 0*1641009 80 0*
 18540 09/22*1641008 80 0*1651007 90 0*1701020 85 0*1801020 50 0*
 NEW** 09/23X1901020 25 0* 0 0 0 0* 0 0 0 0 0* 0 0 0 0 0*

***** **

Based on extrapolation and info in MWL.

Storm #21/1985 WALDO - 2008 Revision

19765 10/07/1985 M= 3 21 SNBR= 474 WALDO XING=1
19770 10/07*1501061 25 0*1581073 30 0*1681081 35 0*1761088 45 0*
19775 10/08*1851093 50 0*1951096 60 0*2051097 65 0*2121097 75 0*
19780 10/09*2211093 80 0*2311083 90 0* 0* 0*
19780 10/09*2211093 80 0*2311083 90 0X2451071 65 0* 0*
***** **

Extrapolation based on MWL

Storm #14/1986 NEWTON - 2008 Revision

20480 09/18/1986 M= 6 14 SNBR= 490 NEWTON XING=1
20485 09/18* 0 0 0 0* 0 0 0 0* 1240945 25 0*1270958 25 0*
20490 09/19*1290970 25 0*1330982 25 0*1360996 25 0*1411010 30 0*
20495 09/20*1481020 35 0*1531029 40 0*1591038 45 0*1671046 45 0*
20500 09/21*1751052 50 0*1851059 65 0*1941064 65 0*2031068 65 0*
20505 09/22*2121073 65 0*2201077 65 0*2281084 65 0*2361091 65 0*
20510 09/23*2451097 70 0*2521099 75 0*2611099 65 0*2671098 65 0*
NEW** 09/23X2731097 50 0* 0 0 0 0* 0 0 0 0* 0 0 0 0*
***** **

Extrapolation to bring inland

Storm #17/1986 ROSLYN - 2008 Revision

20590 10/15/1986 M= 8 17 SNBR= 493 ROSLYN XING=1
20595 10/15* 0 0 0 0* 0 0 0 0 0* 0 0 0 0* 1020927 25 0*
20600 10/16*1030941 30 0*1050953 35 0*1070968 40 0*1080980 45 0*
20605 10/17*1100996 50 0*1131010 65 0*1151026 75 0*1171041 85 0*
20610 10/18*1191053 90 0*1211065 100 0*1231077 110 0*1271088 115 0*
20615 10/19*1301094 120 0*1341101 125 0*1381107 125 0*1441113 125 0*
20620 10/20*1521117 115 0*1611121 115 0*1711120 90 0*1811116 75 0*
20625 10/21*1911111 75 0*2021105 75 0*2081098 65 0*2141090 65 0*
20630 10/22*2201081 65 0*2271071 65 0* 0 0 0 0* 0 0 0 0*
20630 10/22*2201081 65 0*2271071 65 0X2351060 45 0* 0 0 0 0*
***** **

Extrapolation to bring inland

CP011990 - AKA - 2013 Revision

Replacing value at: 1990-08-13 12Z was 15.0N 179.0W with 15.0N 179.0E

Typographical error

EP142003 - NORA - 2013 Revision

Replacing value at: 2003-10-08 06Z was 21.0N 108.0W with 20.6N 109.2W

Point inadvertently repeated

CP012009 - MAKA - 2013 Revision

The b-decks are missing 12 and 18Z on the 13th. Convention in the best tracks is to always give a 6 hourly latitude longitude, even for cases like this that being as a TC, degenerate to a disturbance, and reform into a TC. Given that it was a "DB" immediately before and after this missing two time periods, it stands to reason that it was a "DB" in between as well:

20090813, 1200, , DB, 14.2N, 179.7E, 25, 1011,
20090813, 1800, , DB, 14.0N, 179.2E, 25, 1011,